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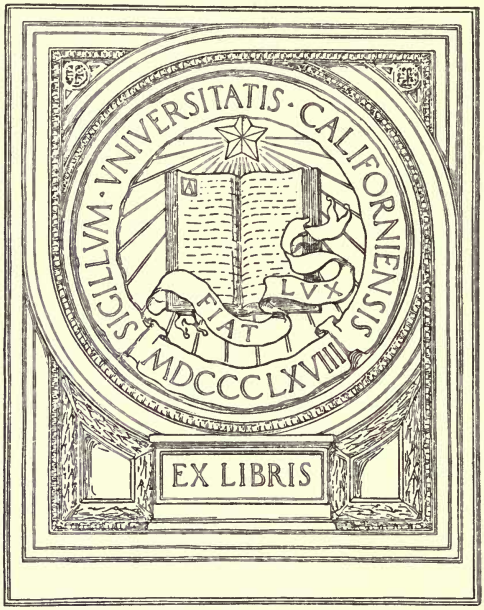

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THE MOLLUSCA

OF

MUSCATINE COUNTY AND VICINITY.

BY

THE MUSCATINE CONCHOLOGICAL CLUB,
MUSCATINE, IOWA.
F. M. WITTER, PRESIDENT.

BOSTON:
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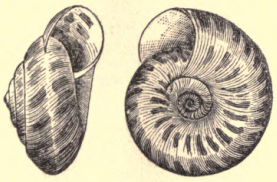

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To the Memory of

THE LATE DR. JAMES LEWIS

OF MOHAWK, N.Y.,

THE FIRST AMONG CONCHOLOGISTS,

AND THE

NEVER-TIRING FRIEND OF THE NOVICE IN THIS BEAUTIFUL AND FASCINATING STUDY,

Is this Little Volume

MOST GRATEFULLY DEDICATED.

PREFACE.

In preparing this list of the mollusca of Muscatine County, we have not thought it desirable to attempt descriptions of well-known species. Where some marked variation or some peculiarity has appeared, that seemed to us likely to be of interest to conchologists, and that would serve as guides to those students and collectors who come after us, we have put it on record. The size, and in some instances the weight, we have given, since it is certain that the conditions under which the mollusk lives exert a marked influence upon these, as well as the form and color.

All the forms catalogued by us are in the cabinet of the president, F. M. Witter; and he has collected all the shells given in our list. We therefore feel certain that no stray shells have crept in from our exchanges.

Much might have been said concerning many species of our *Unionidæ*, but we found it necessary to write somewhat according to our purse. We do not see why the *length* of a shell should always be less than its *breadth*. In giving the measurements in the families *Unionidæ* and *Corbiculadæ*, we use the terms "length," "breadth," and "diameter" as follows: when the shell is placed in the position it occupies when travelling, the greatest horizontal space it fills we call its *length*, and the greatest space filled at right angles to this, and vertical, we call its *breadth;* and, when the shell is placed on its side, the greatest height in this position we call its *diameter*. We regard the shell as having three *axes*, all at right angles to each other: therefore, in any shell that is a sphere, these will be equal. All measurements of shells are from examples found in this county or vicinity, unless otherwise specified. We have measured the largest, and, where a great difference existed in the size of the mature shell, we have also given the smallest. We have followed an alphabetical order in the family *Unionidæ*.

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As this may fall into the hands of conchologists, we would like to ask a few questions, especially in relation to the interesting family *Unionidæ*.

What is known about the sex? We are led to believe they are hermaphrodite, with neutrals.

How do the muscular impressions change as the mollusk grows? For example: in a young *A. grandis* the anterior and posterior adductors may be less than an inch apart; eventually they are more than six inches apart. How does this occur?

Does the form of a shell alter with age?

Is there a period of maturity? How long do they live? What is the nature of their food?

These questions may all have been fully explained; but we have seen nothing satisfactory.

In the study of our mollusca, we have used the following works in the library of F. M. Witter, and numerous exchanges of shells from various parts of the United States. Lea's Naiades, from "Philadelphia Transcript;" "Observations on the Genus Unio," the last six volumes, and "Synopsis of the Family Unionidæ," of 1870; "American Conchologist," seven volumes; "Monograph of the Unionidæ," by Conrad; "Monograph of the Terrestrial Mollusca of the United States," by George W. Tryon, jun.; "Mollusca of New York," by James E. DeKay; "Land and Fresh-Water Shells of North America," Parts I., II., III., and IV., Smithsonian publication; "American Conchology," Say; "Recent and Fossil Shells," Woodward; "Treatise on Shells and Shell-Fish," by Swainson; "Conchologia Cestrica," Hartman & Michener; "Turton's British Shells," by J. E. Gray; "Land and Fresh-Water Shells of La Salle County, Ill.," by W. W. Calkins; and various local lists and reports in government surveys.

We desire to express our thanks to Dr. R. M. Byrnes of Cincinnati, O.; Dr. James Lewis of Mohawk, N.Y.; Professor George W. Tryon, jun., Philadelphia; Professor John W. Taylor, Leeds, Eng.; and many other gentlemen with whom we have corresponded, and exchanged specimens. The following is a list of those who have been or are now connected with our club: F. M. Witter and daughter Anna, George Moore, Albert Knoblauch, James Stockdale, William L. Roach, Charles Braunwarth, Fred. Green, John Fogarty, John Dobbs, Isaac Mathewson, Emanuel Daniels.

THE MOLLUSCA

OF

MUSCATINE COUNTY AND VICINITY.

HELICIDÆ.

HELIX.

H. arborea, Say. — Abundant wherever any protection from the sun is afforded. Seems to be somewhat gregarious; 20 to 30 sometimes found together in hibernation. Greatest diam., 6.6; least, 5.6; height, 3 mm.

H. viridula, Menke. — Very rare. Found with *arborea*, from which it is difficult to clearly distinguish it. Greatest diam., 5; least, 4.3; height, 2 mm.

H. minuscula, Binney. — Somewhat rare. In all damp woods, in mould about logs and stumps. Greatest diam., 1.8; least, 1.6; height, .8 mm.

H. fulva, Draparnaud. — Rare. Wide-spread in damp woods. Shell fragile. Greatest diam., 2.4; least, 2; height, 1.4 mm.

H. lineata, Say. — Rare. Widely distributed; damp woods and deep ravines. Greatest diam., 3.8; least, 3.6; height, 1.4 mm.

H. concava, Say. — Rather rare. Wyoming Hills; Cedar River bottom; railroad one mile north of Muscatine; one mile above Drury's Landing, along foot of bluff, in Illinois. Greatest diam., 16; least, 13; height, 6.5 mm.

H. alternata, Say. — Common. In loam in woods. Greatest diam., 21; least, 18; height, 10 mm.

H. perspectiva, Say. — Very rare. Only two specimens have been

reported from this region, and these were found on Geneva Island by F. Kaufmann, jun. Greatest diam., 9; least, 8; height, 3.4 mm.

H. striatella, ANTHONY. — Quite rare. Railroad one mile north of Muscatine; in sandy loam. Greatest diam., 5.6; least, 5; height, 2 mm.

H. labyrinthica, SAY. — Rare. In nearly all of our groves; somewhat more common near Des Moines, Io. Greatest diam., 2.6; least, 2.4; height, 1.6 mm.

H. hirsuta, SAY. — Common. Along railroad north of Muscatine; foot of bluff above Drury's Landing; Des Moines, Io.; collects in considerable numbers in hibernation. Greatest diam., 9; least, 8; height, 4.6 mm.

H. monodon, RACKETT. — Very rare. Dead shells found occasionally. Not so rare near Des Moines. Greatest diam., 10.75; least, 9.1; height, 5.6 mm.

Var. leaii, WARD. — Abundant along railroad north of Muscatine; found along foot of bluff above Drury's Landing. It seems to hibernate in holes made by burrowing animals. Greatest diam., 8.4; least, 7.4; height, 4.6 mm.

H. albolabris, SAY. — Very rare near Muscatine, not more than four live shells having been found in the past three years; very abundant near Des Moines, along with *clausa*, *profunda*, and *alternata*. The Iowa *albolabris* is a more delicate shell, and nearer white than the same species from Ohio and eastward. It is often of a pink shade. Greatest diam., 27; least, 24; height, 15.2 mm.

H. multilineata, SAY. — Very abundant on Geneva and adjacent islands, two miles east of Muscatine; rare at Gooseberry Point, nearly opposite the city of Muscatine; but those found at this place are nearly all without bands (*alba*), or the bands are so crowded as to render it difficult to separate them, giving the shell a strong tinge of red (*rubra*). One specimen of the variety *alba* measures as follows: greatest diam., 26; least, 23; height, 19.4 mm., being unusually high. A banded example from Geneva: greatest diam., 30; least, 25; height, 15.6 mm. And a banded specimen found near this city measures as follows: greatest diam., 17.8; least, 15.6; height, 12 mm.

H. thyroides, SAY. — Very rare in Muscatine County or in Iowa, so far as we know. Judging from dead shells, it was quite abundant, not long ago, at Wyoming Hills, eight miles east of Muscatine. Live shells are very rare there now, it being the only place where the species is found in Iowa in this region. Common two miles above Drury's Landing, along foot of sandstone bluffs. Greatest diam., 26.6; least, 22.2; height, 15 mm.

H. clausa, SAY. — Very rare in this region. Both dead and live shells have been found in nearly all our deep ravines. Very abundant three miles north of Des Moines, along with *albolabris*, *profunda*, and *alternata*. The largest and smallest mature specimens found here measure as follows: greatest diam., 19.4, 15.6; least, 15.4, 13; height, 12.2, 9.8 mm., respectively.

H. profunda, SAY. — Has not been found in this vicinity in Iowa. Occurs at Gooseberry Point, two miles above Drury's Landing. and near Des Moines. At all of these places it is rare. A white variety is common among the specimens found. White variety, greatest diam., 29.4; least, 25; height, 14 mm. Banded variety, greatest diam., 29.4; least, 24.8; height, 15 mm.

H. pulchella, MÜLL. — Common, in Mr. J. Stockdale's yard in Muscatine, the only place where we have found it alive. It is common in the loess of this city, and we have live specimens of the variety *costata* from Davenport. Those from the loess are somewhat *costate*, live shells from Mr. Stockdale's yard are the true *pulchella*, and those from Davenport are conspicuously *costate*. They differ greatly in size. Loess, greatest diam., 3 mm.; Stockdale's, 2.4 mm.; Davenport, 2 mm.

LIMAX.

L. campestris, BINNEY. — Abundant about gardens.

CIONELLA.

C. subcylindrica, LINN. — Rare. One mile north of Muscatine on Chicago, Rock Island, and Pacific Railroad embankment; under vines in sandy loam. Has not been found elsewhere in this county, and has not been reported from any other part of

the State. It was common, or almost abundant, at the place mentioned above, some three years ago. Length, 5.6 mm.

PUPA.

P. pentodon, SAY. — Rare. About old logs and leaves where it is damp.

P. fallax, SAY. — Very rare. Appears to be confined to a space scarcely more than ten feet square in a woodland about one mile above Muscatine.

P. armifera, SAY. — Widely dispersed. Prefers loam among grass-roots about stumps and logs in woods. Common.

P. contracta, SAY. — Common. Found with *armifera.*

SUCCINEA.

S. ovalis, GOULD. — Very abundant in swamps. Associated with *Limneæ.* Shell very thin.

S. avara, SAY. — Rare. Two forms are found here, — one, extreme length, — mm., and seems to live in the ground; the other, — mm. long, and has about the same habit as *S. obliqua.*

S. obliqua, SAY. — Abundant on Geneva Island with *H. multilineata.* Shell much stronger than *ovalis.* They do not seem to be hermaphrodite.

PHYLOMYCIDÆ.

TEBENNOPHORUS.

T. carolinensis, BOSC. — Common. In woods about old decaying stumps and logs. Easily found on warm, damp days. The same may be said of all our land-mollusks.

AURICULIDÆ.

CARYCHIUM.

C. exiguum, SAY. — Common. This minute mollusk is wide-spread; is found under damp, decaying leaves in woods.

LIMNEIDÆ.

LIMNEA.

L. reflexa, SAY. — Abundant in nearly all of our ponds; and there are almost as many different forms as ponds. Near West

Liberty, in Muscatine County, is a form which approaches very near to the typical *reflexa* of Say. Average measurements of some of the different forms are as follows: —

Length. mm.	Greatest Diameter. mm.	Length of Aperture. mm.
37	12	18
37	13	17
37	12	15
32	9	13
27	10	13

One variety is slender, wrinkled, and very light color, whilst most of the others are dark, rather tumid, and scarcely wrinkled. Variety *zebra* (Tryon) has in some specimens well-marked, alternating dark and light lines or bands parallel to the margin of the outer lip; but it shades off into varieties without light lines. The short form was very abundant two years ago in Brigg's Slash, on Muscatine Island. The epidermis was either eaten or eroded from the spire of nearly all of this variety.

L. desidiosa, Say. — Abundant along muddy margins of ponds. Light horn color; slight umbilical opening. Length of shell, 14; of aperture, 8 mm.

L. pallida, Adams. — Was very abundant about three years ago in a small pond in Muscatine, but seems now to be extinct in this region. Length of shell, 11.5; of aperture, 6.5 mm. Epidermis is dark, or black; but this may be some substance foreign to the shell. Shell bluish white in the aperture. It is probable that *L. humilis* (Say) is found here, inasmuch as it is reported by Mr. W. A. Marsh, from Aledo, Ill., only eighteen miles from Muscatine; and we have small *Limneæ* that do not seem to fall under *desidiosa* or *pallida*.

PHYSA.

P. gyrina, Say. — It is very difficult to say whether this species is abundant or not, or whether it really exists here. We have plenty of *Physæ;* but just what they all are, it seems nobody knows. As far west as Des Moines, the relative length of aperture and shell accords better with Say's description of the species than shells found here. The largest *Physa* that I

have seen from this State is 24 mm. long; aperture, 16 mm.; and greatest width, 14 mm. Whirls, about 6; spire very acute. This form has been called *heterostropha* (Say) by many of our correspondents.

P. heterostropha, Say. — Abundant. Length of shell, 19; of aperture, 15; diam. of shell, 12 mm. Whirls, 5; first very large; epidermis very light horn color.

P. ampullacea, Gould. — This may be a form of *heterostropha;* but it has been called *ampullacea*, and it corresponds to the figure and description in Part II., "Land and Fresh-Water Shells" (W. G. Binney). Length of shell, 19; of aperture, 13; diam., 10 mm. Whirls, 5, reddish horn color; shell firm.

P. virgata, Gould. — I discovered this beautiful little *Physa* in a pond in South Muscatine, in the spring of 1877, along with *ampullacea* and *heterostropha*. The pond became dry the following year; and it has not been found elsewhere in this vicinity. Length of shell, 10; of aperture, 7.5 mm.

PLANORBIS.

P. trivolvis, Say. — Common. This species is protean.

P. bicarinatus, Say. — Common. Diam., 12 mm.

P. exacutus, Say. — Common. Diam., 6.6 mm.

P. deflectus, Say. — Somewhat rare. Might be mistaken for *albus*. Diam., 6 mm.

P. albus, Mül. — Common. Diam., 6 mm.

P. parvus, Say. — Common. Diam., 4 mm.

SEGMENTINA.

S. armigera, Say. — Hardly common. We have called this species *wheatleyi* heretofore; but, on careful examination, it seems to be *armigera*. Diam., 7 mm.

ANCYLUS.

A. diaphanus, Haldeman. — Somewhat rare. This species was identified for us as *fuscus;* but, on studying the figures and description in "Land and Fresh-Water Shells," Part II. (W. G. Binney), I am satisfied our *Ancylus* must be *diaphanus*,

unless *fuscus* is extremely variable. Shell almost transparent; apex obtuse. Length, 7; breadth, 4.2; height, 2 mm. We have a long, dark form, which answers closely to the description of *parallelus* (Haldeman). Length, 8.6; breadth, 4.8; height, 2.5 mm. Many of our dark forms are probably *diaphanus*, covered more or less with some foreign substance. So far, they have been found in *stagnant* water only, and I believe entirely in Muscatine Slough and Keokuk Lake.

VALVATIDÆ.

VALVATA.

V. tricarinata, Say. — Abundant in nearly all of our ponds. Two forms, easily distinguished, abound here. We have not yet found both forms in the same pond. But for this we should be disposed to regard one as a *prolific*, and the other a *sterile* form. One form is flat, with apex of spire a little below a level with the last whirl; umbilicus large and shallow: greatest diam., 5.6 mm. The other has an elevated spire, a small and deep umbilicus: greatest diam., 4.6 mm. The latter is a much smaller shell, as is plainly shown in not less than a hundred specimens of each form in our collection.

VIVIPARIDÆ.

VIVIPARA.

V. intertexta, Say. — Abundant in most ponds, and especially in Muscatine Slough and Keokuk Lake. Some shells show light bands parallel with the sutures. Length, 28 mm.

V. contectoides, W. G. Binney. — We have one "dead" shell of this species found on the bank of the Cedar River, at Moscow, in Muscatine County. The shell is in good condition, and plainly indicates the existence of the species near where it was found. Length, 27.5 mm.

MELANTHO.

M. subsolida, Anthony. — Very common. We have the form described by Anthony. A specimen in my collection has 7½

whirls; is perfect to the apex. Length of shell, 51; of aperture, 23 mm.

M. decisa, SAY. — Abundant. I doubt very much if any well-marked difference exists between this and the preceding. Length of shell, 34; of aperture, 18 mm. A reversed "dead" shell, probably a *decisa*, was found at Moscow in this county. We have examples of this genus from Alabama, New York, Ohio, Michigan, Illinois, and Iowa: they are called *ponderosa*, *obesa*, *integra*, *decisa*, *subsolida*, *rufa*, etc. In the whole range there seems to be no more difference or variation than exists in our *H. multilineata*. The larger and heavier shells are in our streams; the lighter, in our ponds.

LIOPLAX.

L. subcarinata, SAY. — Common. In ponds. Most specimens show a *carina* near the apex. Length of shell, 16; of aperture, 8 mm.

RISSOIDÆ.

BYTHINELLA.

B. obtusa, LEA. — Rare. In ponds. Length, 4.2 mm.

SOMATOGYRUS.

S. isogonus, SAY. — Common. In ponds and slow-running streams. Length of shell, 8.2; of aperture, 5.8 mm.

AMNICOLA.

A. cincinnatiensis, ANTHONY. — Common. Ponds. Length, 5 mm.

POMATIOPSIS.

P. lapidaria, SAY. — Very rare. We have in our collection three good specimens of "dead" shells, evidently of this species, which we found among drift-wood on the bank of the Mississippi, about two miles above Muscatine. They could hardly have come from the loess, a mile or two farther up, since we have not yet found them in this deposit anywhere in this region; and we have not found other shells of the loess along the river in this way. Length of shell, 6.8; of aperture, 2.2 mm.

STREPOMATIDÆ.

PLEUROCERA.

Pleurocera subulare, LEA. — Was very abundant at the mouth of Burdett's Slough three years ago, but we have hardly found it since. "Dead" shells abound along the Cedar. Length of shell, 23; of aperture, 7; diam., 7 mm.

GONIOBASIS.

G. cubicoides, ANTHONY. — A few "dead" shells have been found on Cedar River. Length of shell, 16.6; of aperture, 7; diam., 8.5 mm.

UNIONIDÆ.

UNIO.

U. æsopus, GREEN. — Common. Mississippi; at Muscatine. Thick near *umbones;* heavy; epidermis in young shells light yellow, dark in old individuals. Length, 8.5; breadth, 6; diam., 4.5 cm.

U. alatus, SAY. — Common in Mississippi. Old shells apparently nonsymphanote; nacre purple. Length, 15; breadth, 9; diam., 5 cm.

U. anodontoides, LEA. — Abundant in Mississippi; found also in the Cedar. There seem to be two forms of this fine shell. Form *a* seems to prefer sand; epidermis pale yellow; no rays; *umbones* plain; is much larger than *b:* length, 12.8; breadth, 6.5; diam., 5.6 cm. Form *b* prefers muddy sloughs, is beautifully rayed with green, and *umbones* are undulated: length, 8; breadth, 3.5; diam., 3.2 cm.

U. asperrimus, LEA. — Somewhat rare. Mississippi River. Two forms abound here. One agrees with figure and description in Lea's "Observations on the Genus Unio," except the shell is much narrower posteriorly, the *umbones* are considerably more elevated, and somewhat more anterior, than in the figure, Plate V., vol. iv.: length, 10.2; breadth, 7.2; diam., 5.3 cm. The other is the same as the example figured and described in Say's "American Conchology:" length, 8.7; breadth, 7.3; diam., 5.3 cm. It may be, the long thin form is sterile, and the other is prolific.

U. arctior, LEA. — Very rare. Among the *gibbosus* (Barnes) found here is occasionally a shell much smaller than the largest *gibbosus*, nacre bluish white, convex on basal edge, and showing rays more or less distinctly. It is, no doubt, a variety of *gibbosus*, since the color of the nacre, and form of basal margin, are both variable in *gibbosus*.

U. capax, GREEN. — Rare. Mississippi. Length, 10.8; breadth, 7.7; diam., 6.8 cm.

U. coccineus, LEA. — Cedar, Iowa, and Des Moines. Some specimens from Iowa City are conspicuously rayed with green. Rather common in the Iowa and Des Moines. Length, 7; breadth, 5.5; diam., 4 cm.

U. cornutus, BARNES. — Common. Mississippi. Epidermis in some examples is closely rayed, with interrupted or zigzag green lines, giving the shell a beautiful appearance. This shades into a light yellow, destitute of rays. One row of increasing tubercles about central in each valve: the largest shells have four to five in each row. Length, 5.5; breadth, 4.6; diam., 4.3 cm.

U. crassidens, LAM. — Rare. Mississippi. This species seems to be very nearly related to *ligamentinus* (Lam.) and *gibbosus* (Barnes). It is *niger* of Raf. A more or less purple nacre, and black epidermis. Length, 14; breadth, 8.1; diam., 6.4 cm.

U. donaciformis, LEA. — If this and *zigzag* (Lea) are two good species, we are unable to say whether it is *rare* or *common*. Habitat Mississippi, on sandy bottoms. Lea figured and described this form in 1827, and *zigzag* in 1829. We can see no difference in our shells, except some are shorter and more tumid than others, and the epidermis varies from green to yellow. Length, 3.4; breadth, 2.2; diam., 1.8 cm.

U. dorfeuillianus, LEA. — It is with some hesitation that we put this species in our list. We are unable to separate it from among the shells found in the Mississippi near us, which we regard *pustulosus*. If Lea's figures and descriptions are correct, we have no shell that quite corresponds to them; but we can place two examples we have from the Cedar, in this county, nowhere else. Shell very thick and heavy, almost without pustules; *umbones* and ligament very prominent. Length, 8.3; breadth, 7.5; diam., 5.6 cm.

U. ebenus, LEA. — Common. Mississippi River. We have shells of this species of all ages; and none of them seem to be marked with yellow behind the beaks, as figured and described by Lea. Length, 8.8; breadth, 7.5; diam., 5.4 cm.

U. elegans, LEA. — Rather rare. Mississippi and Cedar. Epidermis usually rayed with green, but some are destitute of rays, having a light-yellow color; nacre generally white, but sometimes pink. The latter is very handsome when polished. The largest shells occur in Cedar. Length, 6.7; breadth, 5.5; diam., 3.7 cm.

U. ellipsis, LEA. — Common. Mississippi and Cedar. Beaks much more anterior in some examples than in others; generally distinctly rayed. Largest shell, so far, is from the Cedar. Length, 8.6; breadth, 6.2; diam., 5.2 cm.

U. gibbosus (dilatatus, RAF.), BARNES. — Mississippi. Common. (See *arctior.*) Length, 10.5; breadth, 5.2; diam., 3.3 cm.

U. gracilis, BARNES. — Common. Mississippi and Cedar. Seems to prefer very muddy bottoms. Resembles *lævissimus* (Lea), but epidermis is less polished; generally rayed with green; posterior wing much less elevated, and no anterior wing; nacre white, with a tendency to purple back of the umbonal cavity; shell very thin, and liable to crack when dry. Largest shells from the Cedar. Length, 16.5; breadth, 10.5; diam., 5.2 cm.

U. graniferus, LEA. — Rare. Mississippi. This is most likely *verrucosus* of Barnes, and should be so called; is a most beautiful shell when polished (the same process as for marble). Nacre purple. Length, 8.5; breadth, 7.2; diam., 5.4 cm.

U. lævissimus, LEA. — Common. Mississippi and Cedar. Epidermis more or less purple, and highly polished; nacre purple; substance of shell very thin. Very young shells are almost transparent; and we have found them attached to objects by byssal threads. Largest shell from Cedar. Length, 17; breadth without wing, 10.5; diam., 4.2 cm.

U. ligamentinus, LAM. — Common. Mississippi. Epidermis in young specimens green when the nacre is white; or, when red is prominent, the nacre is pink. Length, 11.3; breadth, 7.1; diam., 5.2 cm.

U. luteolus, LAM. — Common in slough below Keokuk Lake.

Found also in Mississippi, creek at Brown's Ferry on Cedar, Mud Creek at Wilton, Des Moines River at Des Moines, Skunk River at Ames: in fact, it is our most widely dispersed species. No little confusion exists concerning this species. There are at least two well-marked forms here, and I am inclined to say three. If we limit the species to those having numerous fine undulating lines on the beaks, we shall include *siliquoideus* (Barnes) and *luteolus* (Lam.), and exclude a form with but two or three coarse folds about the beaks, which we believe may be called *ventricosus* (Barnes); but the figure of this species in American conchology is nearer to our *occidens* (Lea). *Siliquoideus* has been abandoned by Lea. This would leave the first group to *luteolus*. Of the long, narrow, and generally thin examples, with numerous undulations about the beaks, those from creek near Brown's Ferry, Skunk, and Des Moines, are much smaller in every way, *umbones* very low, and epidermis with few and small green rays over the light-yellow ground. The largest of this group measures as follows: length, 7.8; breadth, 4.4; diam., 2.2 cm. Those from Muscatine Slough and Mud Creek are much larger; *umbones* very prominent; green rays generally numerous and broad; old specimens nearly black. Some examples are very beautiful. Length, 11.3; breadth, 6; diam., 4.5 cm. In both groups there are thin forms, narrow and rounded, or somewhat pointed posteriorly; and short, tumid forms, wider, and truncated posteriorly. An example of the latter form measures, length, 9.6; breadth, 5.8; diam., 6.2 cm. These are, no doubt, sterile and fertile forms.

U. metanevrus, Raf. — Common. Mississippi and Cedar. We have a rare form, with few or no tubercles, and with a very prominent lobe, gradually increasing in width from the *umbones* to the posterior basal margin. Length, 6.7; breadth, 5.5; diam., 4.5 cm.

U. monodontus, Say. — Mississippi, near mouth of Geneva Creek, and on sand-bar opposite Mr. B. Hershey's mill, we have found a few "dead" shells. Those at the latter place were nearly fresh. No live shells have been secured, so far as we know, nearer than Davenport. Length, 12.5; breadth, 4.8; diam., 3 cm.

U. multiplicatus, LEA (**heros,** SAY). — Very rare. Mississippi, at Muscatine, and lake near Port Louisa. Length, 16; breadth, 11.2; diam., 7.2 cm. A "dead" shell found near Port Louisa measures, length, 17.5; breadth, 12.5 cm.; and weighs 1.5 lbs.

U. mississippiensis, CONRAD. — Abundant in Muscatine Slough, above Keokuk Lake. It abounds in nearly all ponds near the Mississippi and Cedar. The sterile form seems to be much larger than the prolific, attenuated and pointed posteriorly; while the latter is less flattened, and is conspicuously truncated at the posterior extremity. Measurements of largest sterile form are, length, 10.7; breadth, 4.5; diam., 3.4 cm.

U. obliquus, LAM. — We have one valve from the Mississippi at Muscatine, of what corresponds to shells called by this name, from the Ohio. The shell is deformed, and may not be *obliquus*. *Obliquus*, as figured and described in "Monograph of the Unionidæ," by Conrad, is *ebenus* of Lea.

U. occidens, LEA. — Very common. Mississippi and Cedar. Young shells are beautiful. It varies in form, and in color of epidermis and nacre. It is often difficult to distinguish it from *ventricosus* (Barnes). The difference cannot be due to the sexes, inasmuch as thin, long forms, and tumid, abrupt, or truncated forms, are found in both groups. *Ventricosus* is generally abundant in the interior streams of this State, and varies towards *luteolus*, whilst *occidens* abounds in the Mississippi, and runs into *ventricosus*. No doubt, *ovatus* (Say) and *subovatus* (Lea) are included in this range of variation. We have a specimen from the Cedar that answers to the figure and description of *subovatus* in Lea's "Observations," except that the *umbones* are not quite so far forward in our shell. *Ovatus* (Say), figured in Conrad's "Monograph," is most probably a form of our *ventricosus* (Say), especially those with a light-yellow epidermis, with few or no rays. It will require considerable skill to make out the difference between the figure of *ventricosus* in Say's "American Conchology," and of *occidens* in Lea's "Observations." Length, 12.5; breadth, 8.5; diam., 6 cm.

U. orbiculatus, HILD. — Rare. Mississippi. Shell variable. Epidermis in young shells generally yellowish brown, and more

or less distinctly rayed: mature specimens are generally dark or black over the *umbones*, though some are decidedly yellow. Nacre generally white, often rose and salmon. Some forms resemble *ellipsis* (Lea); are figured and described in "Monograph of the Unionidæ," by Conrad, under the name of *crassus* (Say); and in Lea's "Observations on the Genus Unio," vol. ix., it is called *higginsii* (Lea). The figures and descriptions of *higginsii* were made from specimens obtained at Muscatine by Mr. Frank Higgins. Some of the shells before us are undoubtedly *higginsii*. In "American Conchology" Say figures and describes another form of this species as *abruptus*. Out of twenty-one examples now before us, eight are certainly *abruptus* of Say. Lea places *abruptus* and *crassus* as synonymes of *orbiculatus* in his "Synopsis of the Family Unionidæ" (1870); and we are constrained to add *higginsii* to the same list. The difference in form is, no doubt, caused by fertility or sterility, and kind and quantity of food.

U. parvus, Barnes. — Hardly common. Mississippi, Muscatine Slough, Cedar, Mud Creek, Des Moines, etc. Length, 3.8; breadth, 2; diam., 1.4 cm.

U. plicatus (Lesueur?). — Abundant. Mississippi, Muscatine Slough, Cedar. Some doubt exists as to the separation of this species from *undulatus* of Barnes, or *costatus* of Raf. The figure and description of *costatus* in Conrad's "Monograph," plate VII., agrees with a form found in Mud Creek at Wilton, and in the Des Moines at Des Moines, which we call *undulatus;* and plate LIX. in same work is our *plicatus*. *Plicatus*, as we have it, is a very heavy shell, reaching one pound four ounces, which is more than *three* times the weight of our largest and heaviest *undulatus* from Mud Creek. *Plicatus* is generally very tumid, has high and prominent *umbones*, and the epidermis of very young shells is decidedly green. *Undulatus* is much less tumid, very low *umbones*, and young shells from Des Moines (the young of this species have not been found in this county) have a light-yellow epidermis. Length, 14.5; breadth, 10.5; diam., 7.6 cm.

U. pustulatus, Lea. — Rare. Mississippi. Length, 7.2; breadth, 6; diam., 4.4 cm.

U. pustulosus, Lea. — Mississippi, Cedar, and Des Moines. We

have already stated, under *dorfeuillianus*, that we cannot find constant characters to separate the two species, if there be two. Some say *pustulosus* is rare here. If so, then *dorfeuillianus* is abundant. What we call *pustulosus*, from the interior streams, seems to fill the figure and description of *schoolcraftensis* of Lea in "Observations." *Vallatus* (Lea) is most likely found in the Des Moines, and, it may be, in the Cedar.

U. pyramidatus, LEA. — Rare. Mississippi. *Mytiloides* (Raf.), as figured and described in Conrad's "Monograph," is the same, it appears to us, as Lea's *pyramidatus*. Nacre generally white, sometimes pink. It is probable that some of our shells catalogued as *solidus* (Lea) are *pyramidatus* of the same author. Length, 8.5; breadth, 6.8; diam., 5.6 cm.

U. rectus, LAMARCK. — Common. Mississippi, Cedar, Des Moines. Nacre generally rose or pink, but occasionally white. Weight, 8 oz.; length, 14.5; breadth, 5.7; diam., 4.6 cm.

U. rubiginosus, LEA. — Rare. Cedar, Iowa, Des Moines. Nacre light pink, or white. Length, 5.8; breadth, 4.5; diam., 3.4 cm.

U. subovatus, LEA. — Cedar. (See *occidens*.) Length, 13.4; breadth, 8.4; diam., 3.6 cm.

U. securis, LEA. — Common. Mississippi. Young specimens are very beautiful. Length, 9; breadth, 6.8; diam., 4 cm.

U. solidus, LEA. — Very rare. Mississippi. (See *pyramidatus*.) It appears to us that *solidus* is the young of *pyramidatus*. Length, 4; breadth, 3.7; diam., 3 cm.

U. spatulatus, LEA. — Very rare. Mississippi. We found one live specimen, at this place, of what appears to be *spatulatus*. The species is found at Davenport and New Boston; but, with this single exception, no shell has been taken here, among the thousands we have collected, that will compare in the least with examples received from Professor Pratt of Davenport, and Mr. Marsh of Aledo, Ill. Our shell is very heavy, much heavier than longer shells referred to above. It is very much the shape of a young *ligamentinus*. Length, 5.6; breadth, 3.2; diam., 2.4 cm.

U. tenuissimus, LEA. — Very rare. Mississippi. Burdett's Slough. Substance of shell extremely thin. Sexual difference seems

to be well marked. This is *leptodon* of Conrad. Length, 7.3; breadth, 3.7; diam., 1.7 cm.

U. triangularis, BARNES. — Rare. Mississippi. Prolific and sterile forms quite distinct. Length, 4; breadth, 2.8; diam., 2.5 cm.

U. trigonus, LEA. — Abundant. Mississippi. Young shells light yellowish brown, sometimes slightly rayed with green. Old shells dark or black, and much produced posteriorly. Length, 7.3; breadth, 6.3; diam., 5 cm.

U. tuberculatus, BARNES. — Common. Mississippi, Cedar. Largest shells from Cedar. Weight, 15.5 oz.; length, 15; breadth, 9.1; diam., 6 cm.

U. undulatus, BARNES. — Rare. Mud Creek at Wilton; common at Des Moines. (See *plicatus.*) Length, 12; breadth, 8.5; diam., 5.6 cm.

U. ventricosus, BARNES. — Mississippi, Cedar, Des Moines; common in the two latter streams. (See *occidens.*) Old shells are almost destitute of rays, and substance of shell thick. Weight of specimen from Cedar, 14 oz.; length, 14.8; breadth, 10.7; diam., 7.8 cm.

U. wardii, LEA. — Very rare in Mississippi; common in Cedar and Des Moines. A very beautiful shell. We believe we can show that this species and *metanevrus* are the same. Where *metanevrus* lives constantly in sand, the shells are lighter in color and substance, *umbones* and tubercles are less prominent, and diameter of shell is less. We have a very fine specimen from the Cedar. Weight, 7.5 oz.; length, 10.5; breadth, 8.4; diam., 5 cm.

U. zigzag, LEA. — Common. Mississippi. After considering Lea's figures and descriptions of this and *donaciformis*, and comparing them from different localities, we think one must at least be a variety of the other. (See *donaciformis.*)

MARGARITANA.

M. complanata, BARNES. — Common. Mississippi, Mud Creek, Des Moines. We have two forms, it may be, two species. We submitted specimens to Dr. James Lewis, and he says, "I think they are the same, though most persons would call them distinct species: the variation in the shell is due to the

greater abundance of food in Mud Creek." Lea says this species is symphynote. We have before us good representatives of both forms. *a* is perfectly symphynote, with a very fine dorsal wing, making the disk somewhat triangular; *b* is entirely destitute of a wing, and consequently is not symphynote, and could not be called triangular; *a* would not be transformed into *b* by loosing its wing; hinge-teeth are much heavier in *b*. Measurements of *a*, length, 14.2; breadth, including wing, 12.3; diam., 3 cm. Measurements of *b*, length, 15.3; breadth, 9.8; diam., 5.2 cm. It will be seen that *b* is much more tumid than *a*. The form *b* is common in Mud Creek at Wilton.

M. confragosa, Say. — Rare. Sloughs and ponds near Mississippi. Lateral teeth plainly present in some examples. Length, 11; breadth, 8; diam., 5.4 cm.

M. deltoidea, Lea. — Mad Creek and Honey Creek, Delaware County, Iowa. In Mad Creek, from two to four miles from its mouth, we have found "dead" shells of this species along with "dead" shells of *A. ferussaciana* (Lea). It is alive in Honey Creek: it seems to have become extinct here recently. *Calceola* (Lea) appears to be the same as *deltoidea*. Length, 2.9; breadth, 1.7; diam., 1.1 cm.

M. marginata, Say. — Very rare. Mississippi, Cedar, Des Moines. We found it in Burdett's Slough. Our shells are very light and small. A specimen from Des Moines measures, length, 6.8; breadth, 4; diam., 2.6 cm.

M. rugosa, Lea. — Mississippi, Cedar, Des Moines. Rare. We found it at Wyoming Hills and in Burdett's Slough. Length, 11.1; breadth, 6; diam., 3.8 cm.

ANODONTA.

A. corpulenta, Cooper. — Muscatine Slough. Rare. Substance of shell very thin; hinge margin straight; ligament hid, or nearly so, by the shell, which is more or less continuous from one valve to the other; *umbones* prominent, with three or four coarse folds about the beaks; epidermis yellowish green; basal margin very convex. We are in doubt about this species. Length, 7; breadth, 5.2; diam., 3.4 cm.

A. decora, Lea. — Muscatine Slough. Rather rare. We have

shells that agree in every particular with Lea's figure and description; but they do not agree with examples called *decora* from Ohio. We have heretofore regarded these the young of *grandis*. Substance of shell very thin; hinge margin straight, and slightly winged back of *umbones;* epidermis light about beaks, gradually becoming darker, and terminating in a black or nearly black band, about midway from beak to basal margin, parallel with lines of growth, the remainder green with rather indistinct rays of lighter color; tumid. This must be the shell that Lea called *decora*. Length, 9.6; breadth, 6.1; diam., 4.7 cm.

A. edentula, Lea. — Rather rare. Mississippi, Cedar, Mud Creek, Des Moines. In the "Natural History of New York" DeKay figures and describes a form *unadilla*, which Lea, in his "Synopsis," gives as a synonyme of *edentula*. DeKay, in the same work, figures and describes *edentula*. The latter may be Say's *undulata;* but we can see no difference between *edentula* and *undulata*. *Edentula* is an exception among the species of the genus as to its habitat. So far, we have found it in our *rivers* only; whilst all the others are limited to our ponds and sloughs, except, it may be, *ferussaciana*, and occasionally a specimen of *grandis*, which we find in the Mississippi. Substance of the shell is much heavier than any other of the sub-genus we have seen; anterior hinge-tooth quite prominent in some shells; nacre generally salmon; muscular impressions very distinct; epidermis dark brown. Length, 8.1; breadth, 5; diam., 3 cm.

A. ferussaciana, Lea. — Mad Creek, Des Moines, Honey Creek in Delaware County. A few "dead" shells have been found in Mad Creek along with *M. deltoidea*. We have found live shells at Des Moines; but the finest are from Honey Creek, where it appears to be common. We have examples from this place and Des Moines that are apparently the same as *wardiana* (Lea). A study of Lea's figures and descriptions of these species, together with specimens, inclines us to believe them the same, or, at most, that the latter is a variety of the former. Shell from Honey Creek measures, length, 8.1; breadth, 4; diam., 3 cm.

A. grandis, Say. — Very abundant in Keokuk Lake, and in our

ponds and sloughs generally. We have never seen a figure or description of *grandis;* neither have we received specimens of this species from other localities. We have sent what we call *grandis* to conchologists all over the country, including England, and we have not had its specific identity doubted. What seems a puzzle to us is the separation of *grandis* from *gigantea* (Lea). The figure and description of *gigantea* answer to what we call *grandis.* Length, 19.7; breadth, 12.5; diam., 9 cm.

A. imbecilis, Say. — Abundant. In all of our ponds and sloughs. Epidermis not so beautiful as those we have received from Ohio. Length, 7.1; breadth, 3.4; diam., 2.5 cm.

A. plana, Lea. — Rare. Isett stone-quarry in this city; creek at Cole's Ferry and at Des Moines. Judging from specimens received in our exchanges, *plana* and *decora* are badly mixed. We cannot place our shells elsewhere, unless *plana* and *decora* are referred to *grandis.* There can be no doubt that the environments of the mollusk influence the characters of the shell. A fine specimen from the old Isett quarry measures as follows: length, 16; breadth, 9; diam., 6.6 cm.

A. suborbiculata, Say. — Common, or even abundant, in Keokuk Lake, and lakes along Cedar, especially the lake on the west bank of Cedar, a half-mile below Moscow. Substance of shell thin; epidermis highly polished, and light color, except in very old individuals it is dark. A fine but rather fragile shell. Length, 17.3; breadth, 13.3; diam., 6 cm.

CORBICULADÆ.

SPHÆRIUM.

S. solidulum, Prime. — Common in streams. Length, 13; breadth, 9; diam., 7 mm.

S. stamineum, Con. — Common. Length, 16; breadth, 13; diam., 10 mm.

S. partumeium, Say. — Common in ponds. Length, 15; breadth, 13; diam., 8 mm.

S. transversum, Say. — Common in ponds. Length, 15; breadth, 10.5; diam., 7 mm.

PISIDIUM.

P. compressum, Prime. Not very common.

SHELLS FOUND IN THE LOESS IN MUSCATINE AND VICINITY.

Helix cooperi, W. G. BINNEY. — Common. **H. fulva**, DRAP. — Common. **H. lineata**, SAY. — Common. **H. pulchella**, MÜLLER. — Common. **H. striatella**, ANTHONY. — Abundant. **Pupa blandi**, MORSE. — Common. **P. muscorum**, LIN. — Common. **P. simplex**, GOULD. — Common. **Succinea avara**, SAY. — Abundant. **S. obliqua**, SAY. — Common. **Helicina occulta**, SAY. — Rare. This species has been found alive and common in Hardin County, Iowa, by Dr. E. H. King of West Liberty, from whom we have received specimens. **Limnea.** — Common at one point near the top of the loess in this city. No other water species has been found in this deposit, so far as we know, in this locality. Not one of all our water-mollusks is found in the loess, and only six of our living land species. The two most abundant in the loess (*H. striatella* and *S. avara*) are apparently nearly extinct here now. The shells are all most perfectly preserved in the loess, and with the exception of the loss of the epidermis, and consequent bleached appearance, they are as complete as the shells we find in our woods and ponds to-day.

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